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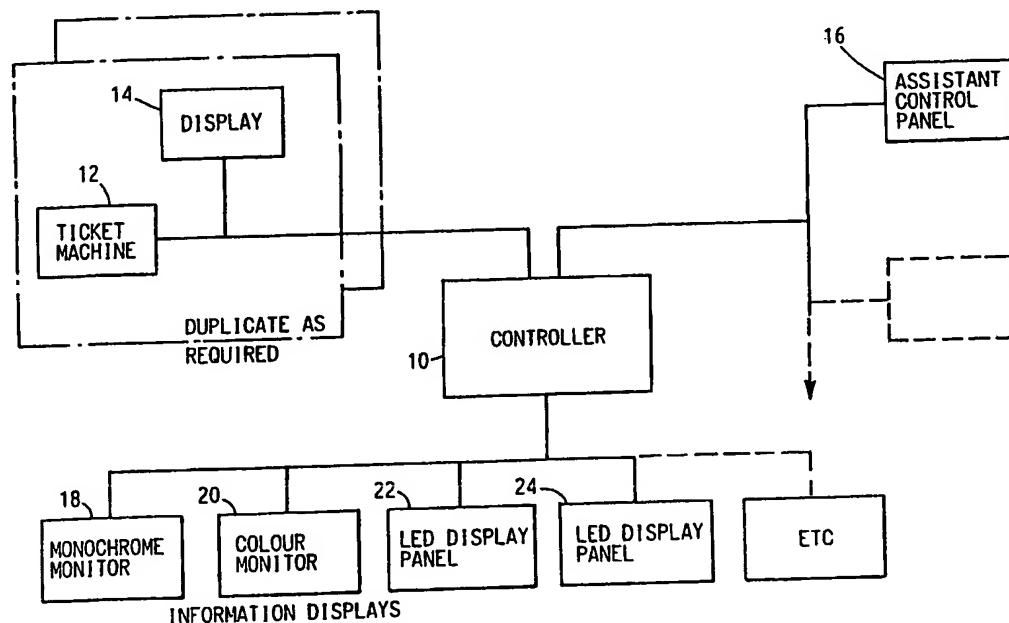
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(54) Title: QUEUE MANAGEMENT SYSTEM



(57) Abstract

A queue management system comprises a controller (10) which communicates with one or more ticket dispensers (12, 14), one or more operator stations (16) and one or more displays (18-24). When a customer takes a ticket from the dispenser (12) a signal is sent to and recorded at the controller (10). When a customer is served a signal is sent to the controller (10) from the operator station (16). Serving information is displayed at the display means based on the data received by the controller (10) from the ticket dispenser (12, 14) and the operator station (16).

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WO 93/04447

QUEUE MANAGEMENT SYSTEM

This invention relates to Queue Management Systems and in particular, but not exclusively, to the management of customers waiting to be served in retail outlets.

In the supermarkets and other large retail outlets it is common practice for some departments to operate a queue management system. In the least sophisticated versions departments such as a delicatessen will mount a ticket dispenser on the serving counter. Customers will take a numbered ticket and will be served in order. Often a display is available to show customers which ticket numbers are being served at a given time. The displays are controlled by the serving assistants who increment the display after they have finished serving a customer.

Queue management systems are particularly useful in supermarkets as they allow shoppers to reserve a place in a queue to be served and then to carry on shopping in other parts of the store. This suits both the shopper, as it reduces shopping time, and the store as it reduces congestion around busy departments such as delicatessens.

Some more advanced queue management systems incorporate a number of displays arranged around the store which are linked to display the same number at a given time. As a further development systems have been implemented in which two separate ticket dispensers produce tickets in order, irrespective of the order in which the dispensers are used. This system requires a system controller which can log the removal of a ticket from either dispenser and increment the next ticket number dispensed from either machine.

Despite the improvements in queue management systems outlined above, the advent of larger stores with larger counter areas and a greater number of assistants serving has resulted in the

existing systems being inadequate. As a result supermarket congestion has increased and there is a strongly felt need in the industry for a queue management system which can improve customer flow and cope with the advances in supermarket store layout.

The present invention aims to meet the need referred to and to provide a method and apparatus for queue management which overcomes the shortcoming of existing systems and is suitable for modern large supermarkets and similar outlets. The system is not only suitable to retail shops such as supermarkets and department stores but may be applied to any situation where queue management is necessary, for example sports grounds, exhibitions, museums and the like.

In essence the invention overcomes the limitations of the prior art by adopting the principle of central control. In this manner any number of assistant inputs display outputs and ticket dispensers can be controlled.

More specifically, the invention is defined by the independent claims to which reference should now be made.

A system and method embodying the invention has many advantages over the prior art. The system is very flexible and can provide any desired information to customers. Moreover, the method and system achieved queue management by avoiding the necessity for customers to crowd around a counter to avoid missing a service turn.

Further advantages accrue from the features of the dependent claims and other features of the preferred embodiment to be described.

An embodiment of the invention will now be described with reference to the accompanying drawing which is a schematic block diagram of a queue management system embodying the invention.

The basic elements of the queue management system are the system controller 10, a ticket dispensing machine 12 with an optional display 14, an assistant or operator control panel 16 and at least one display. In the figure four separate displays 18, 20, 22, 24 are shown by way of example. Further displays may be added as desired.

All the elements of the system are linked to the controller 10. In the case of the assistant control panel 16 and the information displays 18-24 the communication is one way; from the assistant control panel to the controller, and from the controller to the information displays respectively.

The displays 18-24 are located at strategic intervals around the store. A main display would be located at the counter to which the queue management systems relate and the remainder located at intervals around the store. One screen could, for example, be situated in a store controllers or managers office so that the queue control can be observed.

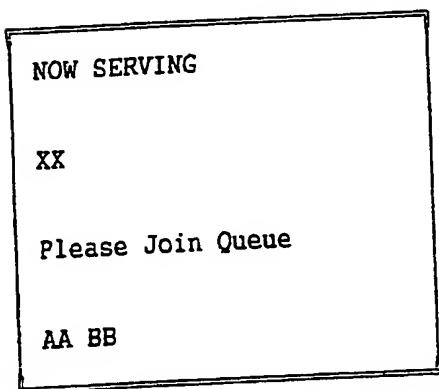
The ticket machine may be located at the counter itself in the simplest embodiment. In more sophisticated versions a number of ticket dispensers are arranged around the store. A monitor 14 with each ticket machine gives the user instructions such as "PLEASE TAKE A TICKET". In addition, the display may give an indication of the waiting time the customer may expect. For example the display may also show: "WAITING TIME XX MINUTES".

The simplest system operates in the following manner. The first customers will take a ticket from the dispensers 12 and will be served by the assistants. The ticket number is supplied to the dispenser from the controller and, when taken by a customer, a 'TICKET TAKEN' signal is sent back to the controller, upon receipt of which the controller increments a ticket number register.

When an assistant is ready to serve a customer he or she presses a button on the assistant control panel 16 which sends a 'SERVING' signal to the controller. On receipt of the serving signal the controller sends a 'NOW SERVING' signal to the display 14 (if present) and the information displays 18 to 24. On receipt of the first 'SERVING' signal the 'NOW SERVING' signal will cause the displays to display the legend 'TICKET NO 1 NOW BEING SERVED' or some similar legend. Each additional 'SERVING' signals causes the controller to send a signal updating the displayed legend by a digit.

In addition to the basic serving information the controller can be used to generate and display further information such as approximate waiting time. The controller can calculate the approximate waiting time on the basis of the difference between the current ticket number and the number being served together with the average time between successive 'SERVING' signals being received at the controller.

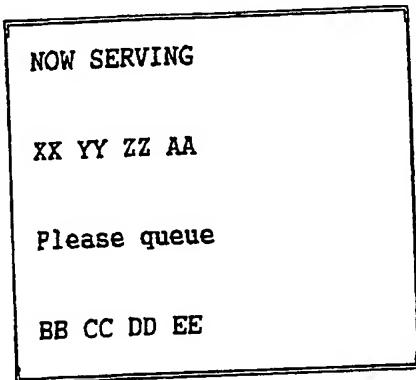
As a variant to displaying merely the present number being served the controller can display both the present number and the next two or three numbers, for example a typical display might read:



In the manner the problem of customers missing their turn is alleviated as their number is displayed for a greater time.

It is envisaged that in most implementations a number of assistants will be serving. Thus, there will be a number of assistant control panels 16a, 16b etc.. These are arranged as shown in the figure such that operator keyed information is transmitted on a single bus to the channel irrespective of which operator/assistant has sent the information. It is not necessary to identify which operator sends, eg a 'SERVING' signal, merely that it has been sent.

With a number of operators, a suitable display format would be:



In this manner congestion around the counter can be reduced and the queue reduced to one person queuing for each customer being served.

Heretofore, the operator control panel has been described as having a single button which indicates that a customer is or has been served. In fact, the panel may be more complex. One button or switch is provided to indicate that the operator is off duty. This will send an appropriate signal to the controller which will then know that one less operator is working at the counter and will revise estimated queuing times and other information accordingly.

Further buttons are provided together with a small display showing the next customer in the queue. For this the communication with the controller must be two-way.

When the assistant finishes with a customer he/she either presses the off-duty button or selects the next customer. If the next customer eg. BB does not show up a further next customer button can be pressed to serve CC. Customer BB remains in the queue but after eg. three successive failures to turn up customer BB will be eliminated from the queue.

If there are no customers waiting to be served, receipt of a 'SERVING' signal at the controller will cause a message to be displayed on the information displays, for example:

'NO QUEUE AT DELICATESSEN'

With the controller arranged to control a number of operator panels, a number of ticket dispensers each having a display, and a number of displays located around the store, the system may operate as follows:

1. If there is no queue the displays 14 at the individual ticket dispensers may be changed to the following:

'WE ARE WAITING TO SERVE YOU
PLEASE STEP UP TO THE COUNTER'

As soon as there are no free assistants the display will switch back to instructing customers to take a ticket and giving the appropriate waiting time.

2. The queuing list will only show the active tickets and as a customer takes a ticket the number will appear in the queue.

3. Waiting time may be calculated in the manner outlined previously. This time may be used to calculate the time at which further tickets should be dispensed before closing time. For example, if the queue length is $\frac{1}{2}$ hr, 30 minutes before the store closes the controller will not react to 'SERVING' signals generated by the operator controls. At such a time the controller can change the display to indicate that the delicatessen is closing.

Many variations to the system described are possible and will occur to the person skilled in the art. Indeed, an advantage of the system is its flexibility which allows adaptation to the requirements of the store in which it is to be installed.

In one modification a keyboard can be used to input information to the controller to display, in addition to the queue management information store information such as special promotions or offers. Queue management monitors may be located at each checkout point which would in addition indicate the status of that checkout, eg. cash only or credit card accepted. As a further development the system may be used in conjunction with the applicants graphic wall display system as described in co-pending application PCT/GB90/01729 published as WO91/13518. In this application graphics information is spread over a number of monitors. Such a combination would allow simultaneous display of queuing information, special offers advertisements etc. Whilst maintaining a display easily readable by the customer. The controller for the system described herein may be the controller described in WO91/13518.

CLAIMS

1. A queue management system for managing the serving of customers at a serving station comprising:

a system controller;

a plurality of ticket dispensers for dispensing tickets carrying serving information including an individual customer identifier, the dispensers being in communication with the controller, whereby the controller controls the identifiers applied to tickets issued by each dispenser so that tickets are issued with an identifier dependent upon the previous ticket issued by the dispenser issuing the present ticket.

a plurality of operator stations to be arranged at the serving station and in communication with the controller; and

a display means communicating with the controller for displaying information relating to the serving of customers holding dispensed tickets, the information displayed being dependent on data communicated to the controller by the ticket dispenser and the operator stations and comprising a first display means for displaying the ticket identifier at present being served and the next n ticket identifiers to be served at the service station in order of issue of ticket where n is the number of operator stations; and a second display means proximate each ticket dispenser for displaying the estimated time until serving based on information received by the controller from the operator stations and the ticket dispensers.

2. A system according to Claim 1, wherein the operator stations each comprise means for indicating to the controller that a ticket holder has not arrived to be served, and the

controller comprises means for instructing the display means to display the next ticket identifier as being ready for serving whilst retaining the unserved identifier temporarily in the queue waiting to be served.

3. A system according to Claim 1 or 2, wherein the first display means comprises a plurality of displays arranged at different locations.

4. A system according to any preceding claim, wherein the operator station comprises means for communicating to the controller and indication that the operator is free to serve a further customer and means for indicating to the controller that the operator is no longer available to serve customers.

5. A method of managing a queue of customers at a serving station comprising:

issuing a ticket from one of a plurality of ticket dispensers to a customer, the ticket carrying serving information including an individual customer identifier, whereby the controller controls the identifiers applied to tickets issued by each dispenser so that tickets are issued with an identifier dependent upon the previous ticket issued by dispenser issuing the present ticket;

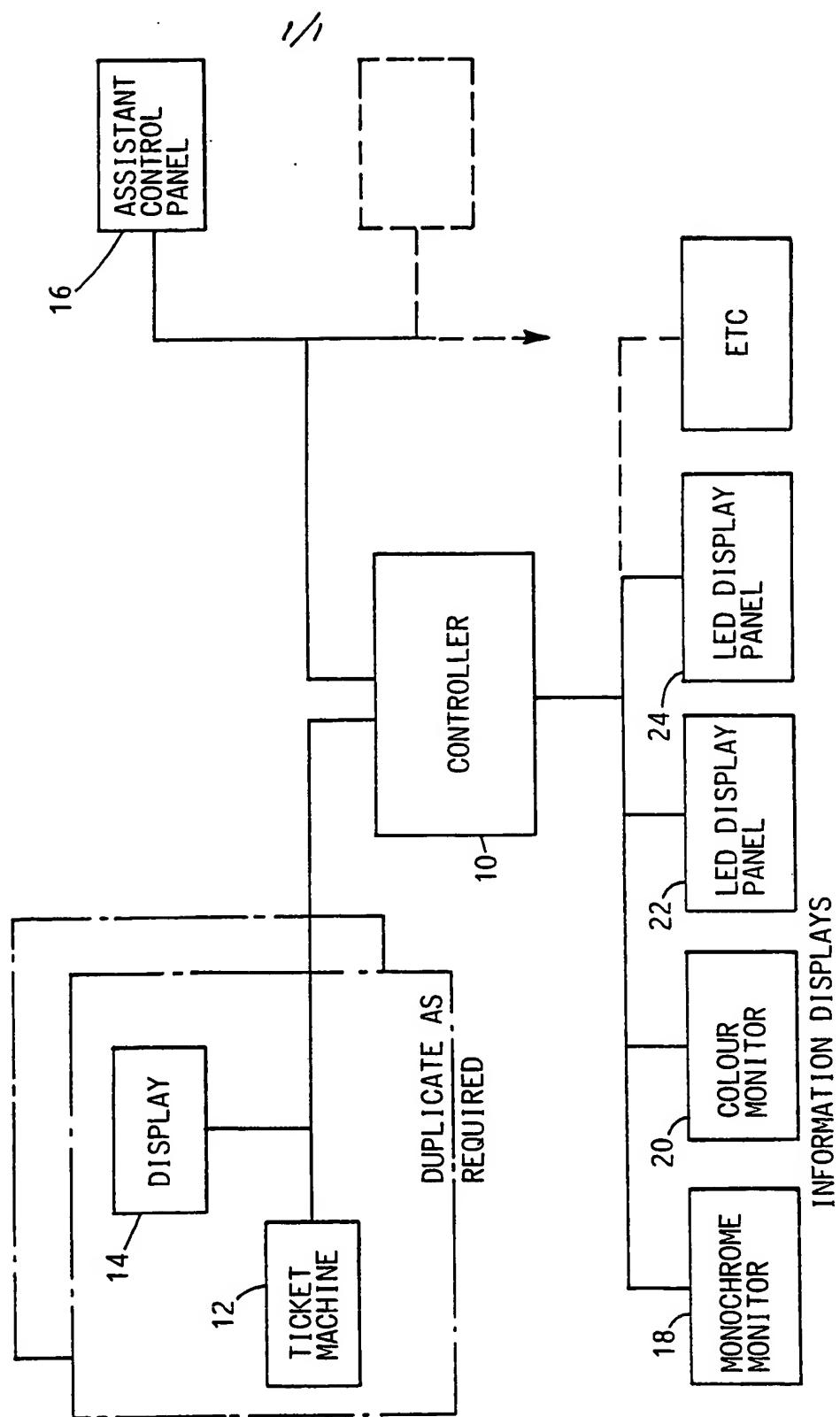
communicating issue of the ticket to a controller;

communicating a plurality of operator stations at the service station with the controller to inform the controller of ticket holders being served; and

displaying information relating to tickets being served at a display means in dependence with data received by the controller from the ticket dispenser and the operator stations, including displaying at a first display the identifier at present being served and the next n ticket identifiers to be served at the service station in order of issue of tickets where n is the

- 10 -

number of operator stations, and displaying at a second display proximate each ticket dispenser, the estimated time until serving based on information received by the controller from the operator stations and the ticket dispensers.



INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 92/01510

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)⁶

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 G07C11/00

II. FIELDS SEARCHED

Minimum Documentation Searched⁷

Classification System	Classification Symbols
Int.Cl. 5	G07C

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched⁸III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	EP,A,0 427 511 (FUJITSU) 15 May 1991 see column 2, line 58 - column 6, line 4 see column 10, line 36 - column 13, line 28; figures	1, 3-5
Y	---	2
Y	EP,A,0 419 285 (RADFORD OF BRISTOL) 27 March 1991 see column 4, line 7 - column 5, line 21; figure	2
A	---	1, 3-5
Y	WO,A,8 300 399 (PETTERSSON) 3 February 1983 see page 1, line 15 - page 3, line 25 see page 8, line 6 - page 10, line 17; claims; figures	1, 3-5
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⁶ Special categories of cited documents :¹⁰^{"A"} document defining the general state of the art which is not considered to be of particular relevance^{"E"} earlier document but published on or after the international filing date^{"L"} document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)^{"O"} document referring to an oral disclosure, use, exhibition or other means^{"P"} document published prior to the international filing date but later than the priority date claimed^{"T"} later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention^{"X"} document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step^{"Y"} document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art^{"A"} document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search 02 NOVEMBER 1992	Date of Mailing of this International Search Report 12.11.92
International Searching Authority EUROPEAN PATENT OFFICE	Signature of Authorized Officer MEYL D.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		Relevant to Claim No.
Category	Citation of Document, with indication, where appropriate, of the relevant passages	
Y	US,A,4 575 707 (IMAZEKI) 11 May 1986 see column 1, line 61 - column 4, line 39; figures ---	1,3-5
A	PATENT ABSTRACTS OF JAPAN vol. 7, no. 42 (P-177)(1187) 19 February 1983 & JP,A,57 191 780 (TATEISHI DENKI) 25 November 1982 see abstract ---	1,5
A	WO,A,8 202 972 (NCR) 2 September 1982 see abstract; claims; figures ---	1,5
A	PATENT ABSTRACTS OF JAPAN vol. 7, no. 282 (P-243)(1427) 16 December 1983 & JP,A,58 158 760 (AUTO STAMP KENKYUSHO) 21 September 1983 see abstract -----	

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. GB 9201510
SA 63221

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
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